REMARKS

Pursuant to the Examiner's suggestion (the Office Action, page 3, lines 8-14), Applicants have amended the specification by replacing "polyol copolymer," all occurrences, with "polyol." Applicants have also amended claim 4 by incorporating all limitations of claim 5 into it, and cancelled claims 1, 2, and 5, and amended claim 3 so that it now depends from claim 4. Thus, claim 4, as amended, is the broadest resin composition claim. Applicants make these amendments without prejudice to their rights to pursue claims to the subject matter as originally filed in a continuing application. Further, Applicants have also amended claims 6-15 to revise their dependency, amended claims 12-14 to delete trademark names, and amended claim 16 to promote clarity. No new matter has been introduced by the above amendments.

Claims 3-4 and 6-19 are currently pending. Reconsideration of this application, as amended, is respectfully requested in view of the remarks below.

Objections

In the previous Office Action dated February 22, 2002 ("Office Action of February 22"), the Examiner states that "[t]he incorporation of essential material in the specification by reference to a foreign application or patent, or to a publication is improper ... The section entitled cross reference to related applications on page 1 should be deleted" (the Office Action of February 22, page 1, 1st paragraph). In response, Applicants deleted the aforementioned section on page 1 (see the response filed on June 24, 2002). Nevertheless, the Examiner, on the one hand, repeats the same statement in the Office Action (page 2, line 16 to page 3, line 2), but on the other, she states that "Applicant indicates intent to delete the 'Cross Reference of Related Application' section on page 1 of the specification. However, this amendment has not been requested" (page 2, lines 13-14). Applicants request clarification.

The Examiner further objects to the term "polyol copolymer." This objection has been overcome by the above amendments.

Rejection under 35 U.S.C. § 112, first paragraph

The Examiner rejects claim 16 under 35 U.S.C. § 112, first paragraph for lack of written description. More specifically, she asserts that "claim 16 recites that the resin is prepared 'without the talc process ... characteristics'; however, the 'talc process' is not described in the specification" (the Office Action, the sentence bridging pages 3 and 4). Albeit implicitly, the specification does describe a process "for providing surface slipping characteristics by coating talc on the surface in a general ribbon process" (page 2, lines 15-19). In any event, Applicants have deleted the term "talc process" recited in claim 6, and submit that this rejection has been overcome.

Rejection under 35 U.S.C. § 112, second paragraph

The Examiner rejects claims 1, 4, 5, 6, 8, 9, and 12-14 under 35 U.S.C. § 112, second paragraph as being indefinite, on seven grounds. See the Office Action, pages 4-5. Applicants traverse below each ground for rejection:

1. The Examiner rejects claim 1 on the ground that "the claim language does not clearly set forth that the polydimethylsiloxane is incorporated into the urethane acrylate oligomer by chemical bonding as distinguished from being added to the urethane acrylate to provide a mixture" (the Office Action, page 4, lines 9-11). Claim 1 has been cancelled, and all of its limitations have been included in claim 4. Applicants would like to point out that amended claim 4 recites a urethane acrylate oligomer that is **synthesized** from a mixture including, among others, a polyol compound containing polydimethylsiloxane. Clearly, this claim language indicates that the polydimethylsiloxane is incorporated into the urethane acrylate oligomer *via* a synthetic reaction, i.e., by chemical bonding.

2. The Examiner points out that "the use of the tradename '[Hsi] 2111' in [claim 4] renders the claim indefinite" (the Office Action, page 4, lines 12-14). Applicants have replaced the tradename, i.e., HSI 2111, with its chemical name, i.e., hydroxy-terminated polydimethylsiloxane, and therefore, overcome this rejection.

3. The Examiner rejects claims 5 on the ground that "it is not clear whether applicant intends to set forth the weight percent polyol containing polydimethylsiloxane in the urethane acrylate oligomer or in the composition comprising the urethane acrylate oligomer" (the Office

Action, page 4, lines 15-17). Applicants disagree. Claim 5 has been cancelled, and all of its limitations have been incorporated into claim 4, which is drawn to a resin composition including, among others, a urethane acrylate oligomer. The urethane acrylate oligomer is synthesized from a mixture including a polyol compound containing polydimethylsiloxane. Claim 4 recites this the polyol compound is in an amount of 5 to 25 wt.% of a photopolymerizable urethane acrylate oligomer composition, i.e., the mixture employed to synthesize the urethane acrylate oligomer.

4. The Examiner points out that "the use of the word 'type' in line 7 [of claim 6] renders the claim indefinite" (the Office Action, page 4, lines 18-19). Applicants have deleted the word, and submit that this rejection has been overcome.

5. The Examiner points to a space between two words in claim 8, and states "it is not clear there is a chemical name missing or whether the space was unintended" (the Office Action, page 4, lines 20-21). The space appears to have resulted from justified alignment and, in any event, was unintended

6. The Examiner rejects claims 9 and 10 on the ground that "it is not clear whether applicant intends to set forth the weight percent catalyst or inhibitor in the composition comprising the urethane acrylate oligomer or in the composition employed to obtain the urethane acrylate oligomer" (the Office Action, page 4, lines 22-24). Each of claims 9 and 10 is dependent from claim 4, which is drawn to a resin composition including, among others, a urethane acrylate oligomer. The urethane acrylate oligomer is synthesized from a mixture including a catalyst and an inhibitor. Claims 9 and 10 recite that the catalyst and the inhibitor, respectively, are in an amount of 0.01 to 1 wt.% of a photopolymerizable urethane acrylate oligomer composition, i.e., the mixture employed to synthesize the urethane acrylate oligomer.

7. According to the Examiner, "claims 12-14 are rendered indefinite by the use of tradenames" (the Office Action, page 5, lines 1-3). The tradenames have been deleted.

Rejection under 35 U.S.C. § 103

I

Claims 1 and 11-19 are rejected as being unpatentable over Duecker (U.S. Patent No. 6,122,428) in view of Shustack (U.S. Patent No. 5,908,837). Among the rejected claims, claim 1 has been cancelled and all of its limitations have been incorporated into claim 4, from which

claims 11-14 depend. Claims 15-16 are drawn to a method of preparing a resin for manufacturing optical fiber ribbon with the resin composition of claim 4. Claims 17-19 are drawn to a resin prepared by the method of claim 15.

Claim 4, the broadest resin composition claim, will be discussed first.

Claim 4 covers a resin composition including (a) a photopolymerizable urethane acrylate oligomer containing polydimethylsiloxane; (b) a monomer; (c) a photoinitiator; (d) a leveling/defoaming agent; and (e) an antioxidant. In this composition, the urethane acrylate oligomer is synthesized from a mixture including, among others, a polyol compound that contains polydimethylsiloxane and is in an amount of 5 to 25 wt.% of the urethane acrylate oligomer mixture.

Duecker teaches a radiation-curable composition, which, according to the Examiner, "comprises [(a)] a **polyether-based** urethane acrylate that, in a preferred embodiment, is silicon-modified ... [(b)] a monomer, [(c)] a photoinitiator and a stabilizer" (the Office Action, page 5, lines 15-17; emphasis added). Indeed, Duecker discloses a urethane acrylate that can be silicon modified. However, the silicon modified urethane acrylate is **polyether-based**, i.e., it includes an ether group in each chemical moiety (e.g., $-(CH_2-O-CH_2)_n-$). By contrast, the urethane acrylate oligomer recited in claim 4, is prepared from a mixture including a **non-polyether-based** polyol compound containing polydimethylsiloxane, i.e., it only includes a hydroxyl group at one or two termini (e.g., $HO-(CH_2-CH_2)_n-$), but does not further include an ether group. Given this substantial difference, Duecker clearly does not teach or suggest the resin composition of claim 4.

Shustack teaches a radiation-curable composition, which, according to the Examiner, includes "[(a)] an aliphatic urethane acrylate oligomer, such as silicone-modified EBECRYL4842, [(b)] a reactive monomer, [(d)] a release agent, [(c)] a photoinitiator and [(e)] an antioxidant" (the Office Action, page 5, lines 22-25). The Examiner proceeds to conclude that "[i]t would have been obvious to one skilled in the art to employ a release agent as disclosed by Shustack as an additive in the compositions disclosed by Duecker in order to obtain the benefits of the properties thereof" (the Office Action, page 6, lines 4-6). Applicants disagree and would like to point out that what Duecker misses is a urethane acrylate oligomer recited in claim 4, i.e., a urethane oligomer that is synthesized from a mixture including, among others, a **non-**

polyether-based polyol compound containing polydimethylsiloxane. Shustack does not make up for what is missing from Duecker. Indeed, Shustack discloses a urethane acrylate oligomer that is silicone-modified, e.g., EBECRYL4842, which is also **polyether-based** (column 7, lines 64-65).

Thus, claim 4 is nonobvious over Duecker and Shustack, either taken alone or in combination. Further, claims 11-19, each reciting the resin composition of claim 4, are also nonobvious.

II

Claims 1-19 are also rejected as being unpatentable over Duecker in view of Shustack, and further in view of Ohtaka *et al.* (U.S. Patent No. 5,787,218).

Again, claim 4, the broadest resin composition claim, will be first discussed.

As mentioned above, claim 4 recites a urethane acrylate oligomer that is synthesized from a mixture including, among others, a non-polyether-based polyol compound containing polydimethylsiloxane.

According to the Examiner, "Ohtaka *et al.* teaches that it is known in the art to employ a urethane catalyst and a polymerization inhibitor to prepare urethane acrylate oligomers" (the Office Action, page 6, lines 13-14). As discussed above, both Duecker and Shustack do not teach or suggest a urethane oligomer that is synthesized from a mixture including, among others, a **non-polyether-based** polyol compound containing polydimethylsiloxane, as required by claim 4. Ohtaka *et al.* does not cure the deficiency in Duecker and Shustack. Indeed, Ohtaka *et al.* teaches a urethane oligomer prepared from a polyol compound with a **polydimethylsiloxane terminal group** (column 4, line 21). By contrast, the urethane acrylate oligomer recited in claim 4 is prepared from a mixture including a polyol compound containing **polydimethylsiloxane in its main chain**.[1] In view of this structural difference, Ohtaka *et al.*, in combination with Duecker and Shustack, does not render obvious claim 4, as well as claims 3 and 6-19, each reciting the resin composition of claim 4.

[1] Since the polydimethylsiloxane–containing polyol compound is a monomer, the polydimethylsiloxane forms part of the main chain of the urethane acrylate oligomer thus obtained.

CONCLUSION

For the reasons set forth above, Applicants submit that the grounds for the rejections asserted by the Examiner have been overcome, and that the claims, as pending, define subject matter that is novel and nonobvious over the prior art.

Attached hereto is a marked-up version of the changes being made by the current amendment.

Note that January 18, 19 and 20 are a Saturday, a Sunday and a federal holiday, respectively, and no extension of time is necessary. Applicants ask that all claims be allowed. Please apply any other charges to Deposit Account No. 06-1050.

Respectfully submitted,

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Y. Rocky Tsao

Y. Rocky Tsao, Ph.D., J.D.
Attorney for Applicants
Reg. No. 34,053

Fish & Richardson P.C.
225 Franklin Street
Boston, Massachusetts 02110-2804
Telephone: (617) 542-5070
Facsimile: (617) 542-8906

Version with markings to show changes made

In the specification:

Paragraph beginning at page 4, line 7 has been amended as follows:

A photopolymerizable urethane acrylate oligomer containing polydimethylsiloxane used in the present invention, as a photopolymerizable oligomer providing for surface slipping characteristics, is preferably synthesized with a photopolymerizable urethane acrylate oligomer composition comprising a) a polyol compound with a polydimethylsiloxane structure, b) a polyol [copolymer], c) polyisocyanate, d) acrylate alcohol, e) a urethane reaction catalyst, and f) a polymerization inhibitor. The photopolymerizable urethane acrylate oligomer containing polydimethylsiloxane preperably comprises 50 to 80 weight% of the resin composition for manufacturing optical fiber ribbon. The increase of shrinkage results in an increase of optical losses due to microbending in the case when there is less than 50 weight% of the resin composition, while viscosities are increased such that there are problems in operation when the resin composition exceeds 80 weight%.

Paragraph beginning at page 5, line 12 has been amended as follows:

Furthermore, the b) polyol [copolymer] preferably has a molecular weight of 100 to 10,000, preferably comprises a repeat unit of $-CH_2CH_2O-$ or $-CH_2CH(CH_2CH_3)O-$, and is preferably selected from the group consisting of polyester polyol, polyether polyol, polycarbonate polyol, polycaprolactone polyol, tetrahydrofuran propyleneoxide ring opening copolymer, ethylene glycol, propylene glycol, 1,4-butanediol, 1,5-pentanediol, 1,6-hexanediol, neopentyl glycol, 1,4-cyclohexane dimethanol, bisphenol A, bisphenol F type diol, and a mixture thereof. The polyol [copolymer] preferably comprises 5 to 30 weight% of the photopolymerizable urethane acrylate oligomer composition. More preferably, 10 to 15 weight% of polyester polyol or polycaprolactone polyol, tetrahydrofuran propyleneoxide ring opening copolymer is used.

Paragraph beginning at page 7, line 5 has been amended as follows:

A method for synthesizing the photopolymerizable urethane acrylate oligomer containing polydimethylsiloxane from the photopolymerizable urethane acrylate oligomer composition is as follows. The polyol [copolymer], polyol compound comprising PDMS structure, and polymerization initiator are put into a reactor and pressure is reduced over 760 mmHg for 30 minutes so that moisture can be removed. This is for removing the possibility of side reactions between moisture and isocyanate. After maintaining the moisture removed mixture at a temperature of 40 to 65 °C, polyisocyanate is added to the mixture, it is stirred at 200 to 300 rpm, and 1/3 of the total catalyst is added. Precautions should be taken since severe heat is generated at this time. The reactant is reacted until –OH peaks on the IR scale have disappeared by maintaining a temperature of 50 to 75 °C after the exothermic reaction. Reaction time is approximately 2 to 3 hours. Acrylate alcohol is then added to the reactant after the reaction, and remained catalysts are also added. Precautions should be taken since severe heat is also generated at this time. The photopolymerizable urethane acrylate oligomer is obtained by reacting the reactant until –NCO peaks on the IR scale have disappeared by increasing the temperature to 60 to 80 °C after the exothermic reaction.

In the claims:

Claims 3, 4, and 6-16 have been amended as follows:

3. (Amended) A resin composition for manufacturing optical fiber ribbon according to claim [2] 4, wherein the first polyol compound containing polydimethylsiloxane has a molecular weight between 100 and 10,000.

4. (Twice Amended) A resin composition for manufacturing optical fiber ribbon comprising

a) a photopolymerizable urethane acrylate oligomer containing polydimethylsiloxane;

b) a monomer;

c) a photoinitiator;

d) a leveling/defoaming agent; and

e) an antioxidant;

wherein the photopolymerizable urethane acrylate oligomer containing polydimethylsiloxane is synthesized from a composition comprising

i) a first polyol compound containing polydimethylsiloxane and selected from the group consisting of [HSI 2111 (]hydroxy-terminated polydimethylsiloxane[)], 1,3-bis(hydroxybutyl)tetramethyldisiloxane, 1,4-bis(hydroxypropyl)tetramethyldisiloxane, and a mixture thereof,

ii) a second polyol compound,

iii) a polyisocyanate,

iv) an acrylate alcohol,

v) a urethane reaction catalyst, and

vi) a polymerization inhibitor,

wherein the first polyol compound containing polydimethylsiloxane is in an amount of 5 to 25 weight% of the photopolymerizable urethane acrylate oligomer ~~composition~~.

6. (Twice Amended) A resin composition for manufacturing optical fiber ribbon according to claim [2] 4, wherein the second polyol compound has a molecular weight of 100 to 10,000; is selected from the group consisting of polyol including a repeat unit of $-CH_2CH_2O-$ or $-CH_2CH(CH_2CH_3)O-$, polyester polyol, polyether polyol, polycarbonate polyol, polycaprolactone polyol, tetrahydrofuran propyleneoxide ring opening copolymer, ethylene glycol, propylene glycol, 1,4-butanediol, 1,5-pentanediol, 1,6-hexanediol, neopentyl glycol, 1,4-cyclohexane dimethanol, bisphenol A, bisphenol F [type] diol, and a mixture thereof; and comprises 5 to 30 weight% of the photopolymerizable urethane acrylate oligomer composition.

7. (Amended) A resin composition for manufacturing optical fiber ribbon according to claim [2] 4, wherein the polyisocyanate is selected from the group consisting of 2,4-tolylenediisocyanate, 2,6-tolylenediisocyanate, 1,3-xylenediisocyanate, 1,4-xylenediisocyanate, 1,5-naphthalene diisocyanate, 1,6-hexanediisocyanate, and isophorone diisocyanate, and is used in an amount of 20 to 40 weight% of the photopolymerizable urethane acrylate oligomer composition.

8. (Amended) A resin composition for manufacturing optical fiber ribbon according to claim [2] 4, wherein the acrylate alcohol is selected from the group consisting of 2-hydroxyethyl methacrylate, 2-hydroxypropyl methacrylate, 2-hydroxybutyl methacrylate, 2-hydroxyethyl acrylate, 2-hydroxypropyl acrylate, 2-hydroxy-3-phenyloxypropyl methacrylate, 4-hydroxybutyl acrylate, neopentylglycol monomethacrylate, 4-hydroxycyclohexyl methacrylate, 1,6-hexanediol monomethacrylate, pentaerythritolpentamethacrylate, dipentaerythritolpentamethacrylate, and a mixture thereof, and comprises 20 to 35 weight% of the photopolymerizable urethane acrylate oligomer composition.

9. (Amended) A resin composition for manufacturing optical fiber ribbon according to claim [2] 4, wherein the urethane reaction catalyst is selected from the group consisting of copper naphthenate, cobalt naphthate, zinc naphthate, n-butyltinlaurate, tristhylamine, 2-methyltriethylenediamide, and a mixture thereof, and comprises 0.01 to 1 weight% of the photopolymerizable urethane acrylate oligomer composition.

10. (Amended) A resin composition for manufacturing optical fiber ribbon according to claim [2] 4, wherein the polymerization [initiator] inhibitor is selected from the group consisting of hydroquinone, hydroquinone monomethylether, para-benzoquinone, phenothiazine, and a mixture thereof, and comprises 0.01 to 1 weight% of the photopolymerizable urethane acrylate oligomer composition.

11. (Amended) A resin composition for manufacturing optical fiber ribbon according to claim [1] 4, wherein the monomer is selected from the group consisting of phenoxyethylacrylate, phenoxydiethylene glycol acrylate, phenoxytetraethylene glycol acrylate, phenoxyhexaethylene glycol acrylate, isobornyl acrylate, isobornyl methacrylate, N-vinylpyrrolidone, bisphenol ethoxylate diacrylate, ethoxylate phenol monoacrylate, polyethylene glycol 200 diacrylate, tripropylene glycol diacrylate, triethylpropane triacrylate, polyethyleneglycol diacrylate, ethylene oxide added type triethylpropane triacrylate, pentaerythritol tetraacrylate, 1,4-butanediol diacrylate, 1,6-hexanediol diacrylate, ethoxylated pentaerythritol tetraacrylate, 2-phenoxyethyl

acrylate, ethoxylated bisphenol A diacrylate, and a mixture thereof, and comprises 15 to 50 weight% of the resin composition for manufacturing optical fiber ribbon.

12. (Twice Amended) A resin composition for manufacturing optical fiber ribbon according to claim [1] 4, wherein the photoinitiator is selected from the group consisting of [IRGACURE #184 (]1-hydroxy-cyclohexyl-phenyl-ketone[)], [IRGACURE #907 (]2-methyl-1((4-(methylthio)phenyl)-2-morpholinopropan-1-one[)], [IRGACURE #500 (]a mixture of [IRGACURE # 184] 1-hydroxy-cyclohexyl-phenyl-ketone and benzophenone[)], [IRGACURE #651 (]2,2-dimethoxy-1,2-diphenylethane-1-one[)], [DAROCURE #1173 (]2-hydroxy-2-methyl-1-phenyl-propan-1-one[)], [CGI #1800 (]a mixture of bis(2,6-dimethoxybenzoyl)-2,4,4-trimethyl-phenyl-pentylphosphineoxide and [IRGACURE # 184)] 1-hydroxy-cyclohexyl-phenyl-ketone, and [CGI #1700 (]a mixture of bis(2,6-dimethoxybenzoyl)-2,4,4-trimethyl-phenyl-pentylphosphineoxide and [IRGACURE # 1173)] 2-hydroxy-2-methyl-1-phenyl-propan-1-one, and comprises 3 to 15 weight% of the resin composition for manufacturing optical fiber ribbon.

13. (Twice Amended) A resin composition for manufacturing optical fiber ribbon according to claim [1] 4, wherein the leveling/defoaming agent is selected from the group consisting of [BYK #371 (]an acrylated polydimethylsiloxane [type] leveling agent[)], [BYK #353 (]a polyacrylate [type] leveling agent[)], [BYK #356 (a polyacrylate type leveling agent), BYK #359 (]a polyacrylate copolymer leveling agent[), BYK #361 (a polyacrylate copolymer leveling agent), BYK #067 (]a polysiloxane [type] defoaming agent[), BYK #141 (a polysiloxane type defoaming agent)], [TEGO RAD #2200 (]an acrylated polyester siloxane copolymer[), TEGO RAD #2500 (an acrylated polyester siloxane copolymer)], and [TEGO RAD #410 (]a polyester siloxane copolymer[), TEGO RAD #435 (a polyester siloxane copolymer), and TEGO GLIDE #453 (a polyester siloxane copolymer)], and comprises 0.1 to 5 weight% of the resin composition for manufacturing optical fiber ribbon.

14. (Twice Amended) A resin composition for manufacturing optical fiber ribbon according to claim [1] 4, wherein the antioxidant is selected from the group consisting of [IRGANOX 1010 (]pentaerythritol tetrakis(3-(3,5-di-tert-butyl-4-hydroxyphenyl)propionate[)],

[IRGANOX 1035 (]pentaerythritol tetrakis(3-(3,5-di-tert-butyl-4-hydroxyphenyl)propionate[)], [IRGANOX 1076 (]octadecyl-3-(3,5-di-tert.butyl-4-hydroxyphenyl)-propionate, and a mixture thereof, and comprises 0.1 to 5 weight% of the resin composition for manufacturing optical fiber ribbon.

15. (Amended) A method of preparing resin for manufacturing optical fiber ribbon, comprising curing the resin composition of claim [1] 4 by photo irradiation.

16. (Twice Amended) The method according to claim 15, wherein the resin has 23 dyne/cm^2 or less surface tension and is prepared [without the talc process] for providing the surface slipping characteristics.